

onto the surface of the carrier is prepared by dispersing alumina in powder form into any suitable dispersion medium such as water, alcohols, and ethers. The sol contains 3 to 15% by weight of alumina. It is to be noted that alumina sol containing more than 15% by weight of alumina has excellent adhesiveness and is suitable for a binder, but this concentration of the sol causes difficulties in that the surface of the monolithic carrier cannot be uniformly coated with the sol due to the excessively high viscosity thereof. Contrastingly, a sol containing less than 3% by weight of the same has poor adhesiveness and is not suitable as a binder, and results in insufficient porosity on the surface coated with the activated alumina. Accordingly it is necessary to select the optimal concentration of alumina sol suitable for the shape and size of the carrier within the range of 3 to 15 Wt% of alumina.

The mixture composition of the activated alumina and/or the aluminum hydroxide and the alumina sol preferably consists of 1 part by weight of the activated alumina or the aluminum hydroxide and not more than 20 parts by weight of the alumina sol. It should be noted that if the alumina sol content is more than 20 parts by weight, the mixture is also unusable because of insufficient content of the activated alumina and/or the aluminum hydroxide. Therefore, 1 part by weight of one of the activated alumina and the aluminum hydroxide is taken to not more than 20 parts by weight of the alumina sol in the method of the present invention. The optimum composition of the mixture should be selected according to the shape and size of the carrier.

In preparation of the mixture containing the activated alumina and/or the aluminum hydroxide and the alumina sol, where the particle size of the activated alumina and/or aluminum hydroxide is less than 30 microns, a single operation of adequate mixing of the both components with a stirrer is sufficient. Whereas, if the particle size is more than 30 microns, the activated alumina and the aluminum hydroxide should be pulverized by a pulverizer such as a ball mill either before or after the mixing with the alumina sol.

The operation of coating the mixture is accomplished by pouring, spraying or painting the mixture onto the inner surfaces of the unobstructed openings of the monolithic carrier, or by immersing the carrier into the mixture. In this coating operation, the commercially available monolithic carrier is usually used as is. However, preferably the carrier is treated with acids such as nitric acid, sulfuric acid, hydrochloric acid, formic acid and acetic acid, or alkalis such as sodium hydroxide, potassium hydroxide, ammonia, sodium carbonate and ammonium carbonate either before or after the coating operation. Thus, the mixture coated on the carrier can be rapidly solidified without long drying, because gelation of the alumina sol in the mixture is accelerated by the acids or alkalis the gelation of alumina sol being known in the art. This gelation treatment prevents the local concentration of the activated alumina or the aluminum hydroxide in the mixture coated on the carrier, which would otherwise occur under the influence of gravity on the particles. This treatment therefore results in a more uniform distribution of activated alumina or aluminum hydroxide on the surface of the monolithic carrier.

The coated monolithic carrier is, after drying well, fired by heating in air at a predetermined temperature of 150° C. to 850° C. for a predetermined time of 0.5 to 20 hours, preferably at 300° to 700° C. for 1 to 5 hours to

obtain the complete monolithic catalyst carrier according to the present invention. In this case, if the firing temperature exceeds 850° C., the activated alumina will lose its activity. If the temperature does not exceed 150° C., the hydrated water of the alumina cannot be expelled.

As a result of the above-mentioned operations according to the present invention, the specific surface area the monolithic carrier increases, for example, from about 2.1 m²/g (before coating) to about 33 to 22 m²/g that is to say, the specific surface area increases to about 10 to 17 times of that before coating. The porosity of the monolithic carrier also increases, for example, from about 0.32 cc/g (before coating) to about 0.34 to 0.40 cc/g; that is to say, porosity increases by about 6 to 25%.

For use as a catalytic converter for an internal combustion engine, the resultant catalyst carrier may be, as is well known, immersed into a solution containing a catalytic component or metal such as a noble metal including a platinum group metal, to impregnate the rugged surface of the carrier with the catalytic component.

The following examples are given for the purpose of further illustrating the method of the present invention and to indicate the benefits afforded through the utilization thereof. It is not intended that the present invention be limited to the description within the examples.

EXAMPLE 1

A mixture of 5 parts by weight of alumina sol containing 8% by weight of alumina component and 1 part by weight of activated alumina powder (particle size 2 microns) was prepared by sufficient mixing with each other. The mixture was poured onto the surface of a commercially available honeycomb monolithic carrier made of cordierite. After the excess mixture was allowed to drain off, the monolithic carrier coated with the mixture was dried at 110° C. for 5 hours, and thereafter fired by heating in an electric furnace at 500° C. for 3 hours.

As a result of this coating operation, the resultant honeycomb monolithic carrier increased in the specific surface area from 2.1 m²/g (before coating) to 26 m²/g and in the porosity from 0.32 cc/g (before coating) to 0.34 cc/g. In addition, a catalytic converter using the honeycomb monolithic carrier prepared according to this method experimentally showed excellent results in its activity and life.

EXAMPLE 2

A commercially available honeycomb monolithic carrier made of cordierite was immersed in a mixture of 3 parts by weight of the same alumina sol as in EXAMPLE 1 and 1 part by weight of activated alumina powder (particle size 2 microns) which mixture was prepared by sufficient mixing. After the carrier was removed from the mixture and the excess mixture was allowed to drain off, the carrier was dried at 110° C. for 5 hours, thereafter fired by heating in an electric furnace at 500° C. for 3 hours.

As a result of this coating operation, the resultant honeycomb monolithic carrier increased in the specific surface area from 2.1 m²/g (before coating) to 33 m²/g and in the porosity from 0.32 cc/g (before coating) to 0.40 cc/g. In addition, a catalytic converter using the honeycomb monolithic carrier prepared according to